



World Meteorological Organization



ORGANIZING COMMUNITY PARTICIPATION FOR FLOOD MANAGEMENT



A Tool for Integrated Flood Management



ASSOCIATED PROGRAMME ON FLOOD MANAGEMENT

March 2008



The Associated Programme on Flood Management (APFM) is a joint initiative of the World Meteorological Organization (WMO) and the Global Water Partnership (GWP). It promotes the concept of Integrated Flood Management (IFM) as a new approach to flood management. The programme is financially supported by the governments of Japan and the Netherlands.



**World
Meteorological
Organization**
Weather • Climate • Water

The World Meteorological Organization (WMO) is a specialized agency of the United Nations. It coordinates the activities of the meteorological and hydrological services of 188 countries and territories and such is the centre of knowledge about weather, climate and water.



The Global Water Partnership is an international network open to all organizations involved in water resources management. It was created in 1996 to foster Integrated Water Resources Management (IWRM).



Note for the reader

This publication is part of the “*Flood Management Tools Series*” being compiled by the Associated Programme on Flood Management. The contained Tool for “Organizing Community Participation for Flood Management” is based on available literature, and draws findings from relevant works wherever possible. This Tool addresses the needs of practitioners and allows them to easily access relevant guidance materials. The Tool is considered as a resource guide/material for practitioners and not an academic paper. References used are mostly available on the Internet and hyperlinks are provided in the “References” section.

This Tool is a “*living document*” and will be updated based on sharing of experiences with its readers. The Associated Programme on Flood Management encourages flood managers and related experts engaged in environmental assessment around the globe to participate in the enrichment of the Tool. *For the purpose comments and other inputs are cordially invited.* Authorship and contributions would be appropriately acknowledged. Please kindly submit your inputs to the following Email address: apfm@wmo.int under Subject: “Organizing Community Participation for Flood Management Tool”.

Acknowledgements

This Tool has exploited the works of many organizations and experts, as listed in the references. Acknowledgement is due to the members of the Hydrology and Water Resources Department in WMO and the members of the Technical Support Unit of the APFM for their competent technical guidance and frank discussions on the issues and for bringing various perspectives into focus.

Disclaimer

The designations employed and the presentation of material in this publication do not imply the expression of any opinion whatsoever on the part of the Secretariat of the World Meteorological Organization concerning the legal status of any country, territory, city, or area, or of its authorities, or concerning the delimitation of its frontiers or boundaries.

APFM Technical Document No. 9, Flood Management Tools Series

©The Associated Programme on Flood Management, 2007





ORGANIZING COMMUNITY PARTICIPATION FOR FLOOD MANAGEMENT

TABLE OF CONTENTS

1. INTRODUCTION.....	1
2. COMMUNITY STRUCTURE AND PARTICIPATION.....	2
2.1 NATURAL FACTORS EFFECTING COMMUNITY PARTICIPATION	2
2.1.1 Riverine floods	2
2.1.2 Flash floods, Mud flows and land slides	3
2.1.3 Coastal floods	3
2.1.4 Urban floods	4
2.2 SOCIAL AND ECONOMIC FACTORS AFFECTING COMMUNITY PARTICIPATION.....	4
2.2.1 Ethnic homogeneity.....	5
2.2.2 Poverty.....	5
2.2.3 Gender	5
2.3 ROLE OF COMMUNITY PARTICIPATION IN FLOOD MANAGEMENT	5
2.3.1 Preparedness	6
2.3.2 Response.....	7
2.3.3 Recovery.....	8
3. ORGANIZING COMMUNITY PARTICIPATION.....	9
3.1 GENERAL PRINCIPLES.....	9
3.2 STRATEGY FOR EFFECTIVE PARTICIPATION.....	9
3.2.1 Participatory process	9
3.2.2 Resources maximization.....	11
3.2.3 Motivation for initiating community participation.....	12
3.3 NECESSARY STEPS.....	13
4 CONCLUSION AND RECOMMENDATION.....	15
ANNEX I STEPS FOR COMMUNITY TRAINING.....	16
ANNEX II FURTHER REFERENCE FOR ORGANIZING COMMUNITY PARTICIPATION FOR FLOODS.....	17
REFERENCES	20
FIGURE	
FIGURE 1. “WA-JU” DIKES AND TRADITIONAL LIFE STYLE.....	3
FIGURE 2. RISK MANAGEMENT STAGES [19]	6
FIGURE 3. STANDARDIZED MARKS FOR FLOODING AND EXAMPLES IN JAPAN	8
FIGURE 4. ORBITS OF STAKEHOLDER INFLUENCE AND COMMUNITY ROLES [9].....	10
FIGURE 5. LEVELS OF STAKEHOLDER PARTICIPATION [9]	10
TABLE	
TABLE 1. COMMUNITY ACTIVITY AND PARTICIPATION (EXAMPLE).....	11
TABLE 2. CHECK SHEET FOR COMMUNITY PRACTICES [21]	12





1. INTRODUCTION

1 Community activities play an important role as a front-line of flood management. Because Integrated Flood Management (IFM) seeks for practical aspects of managing floods, community participation becomes fundamental and essential for each stage of the management, that is, preparedness for, response to and recovery from flood disasters. Community activities form an integrated component of flood management. They seek to maximize the benefits through the related development activities within the river basin as a whole. Community activities provide essential opportunities for water resources development within the context of Integrated Water Resources Management (IWRM) and IFM. The benefits are derived at various levels of social and economic activities through development policy and land-use planning. As the community comprises of various sub-groups, its activities contribute to coordinate their interests and maximizing their benefits through building consensus within community, including the benefits from ecosystem. While extent of community participation is based on community's historical experience and traditional backgrounds, the starting point in IFM is the understanding of the vision for the river basin as a whole.

2 In the absence of organized community participation, most of the activities are carried out at individual or household level driven by individual necessity. Such activities are limited in their effectiveness and insufficient to protect the community at large and individuals in the long run from adverse impacts of floods. On the other hand, if the activities based on individual initiatives are pooled together and carried out in an organized manner at community level, vulnerability and risks due to floods can be substantially reduced [1].

Community activities to enhance participation can be rationalized through three aspects. These are;

- community's needs,
- their effectiveness and efficiency, and
- practicability for implementation.

3 There is no single recipe for organizing effective community participation for flood management. This tool provides general guidelines to effectively organize 'appropriate' community activities to ensure their participation at various levels of decision making within IFM. It is addressed to the local leaders who organize community activities and build capacity through participation of community members.

4 Several issues related to the engagement of flood managers, NGOs, and policy makers in harmonizing community activities with other development policies and natural disaster, are also addressed to build necessary institutional frameworks to enhance community participation. This paper is divided into three parts.

5 Chapter 2 looks into background information required to organize effective community participation related to flood management. Various natural and socio-economic factors, including flood magnitude and frequency, exposure and vulnerability of the community to flood risks help understand basic needs and necessity for community activities. How community has been traditionally involved in flood management in such cases is of primary importance.

6 Chapter 3 discusses various steps towards organization of community based activities in flood management. Based on the general principles for community activities, strategic approach for resource maximization, participation and involvement, motivation for community participation is shown and followed by necessary steps.

7 Chapter 4 concludes this paper and mentions the sustainability and continuous improvement of community participation. This tool will be updated in accordance to accumulation of many cases. In addition, case studies related to community participation are listed in ANNEX II for further reference.

* [] indicate the reference listed at the end of the article



2. COMMUNITY STRUCTURE AND PARTICIPATION

8 Several factors determine the potential and actual participation of the communities and need to be considered before initiating community activities in support of flood management. The strategy for involving communities in flood management activities should depend on the natural characteristics of the floods experienced in the past and the socio-economic conditions. It is useful to understand these factors that clarify the relationships between flood risks and the communities.

2.1 NATURAL FACTORS EFFECTING COMMUNITY PARTICIPATION

9 Natural factors that affect the way community perceives and responds to flood risks can be described in terms of the mechanisms, hydraulic and hydrological characteristics of flood hazards; their magnitude (scale, duration, intensity) and frequency. If flood hazards are experienced regularly, communities innovate and adapt their lifestyle to deal with these hazards. Such a lifestyle may not be ideal and one that civil societies would be contend with, but helps the people survive. It could act as an indigenous asset or a hindrance to organizing community activities. Various other kinds of natural and man-made risks that the community faces and their relative magnitude vis-à-vis the flood risks also have large influence on the perceptions of these risks. Thus, the factors that determine the characteristics of a natural hazard in each region forms a crucial ingredient for participation and should be clarified in developing community activities.

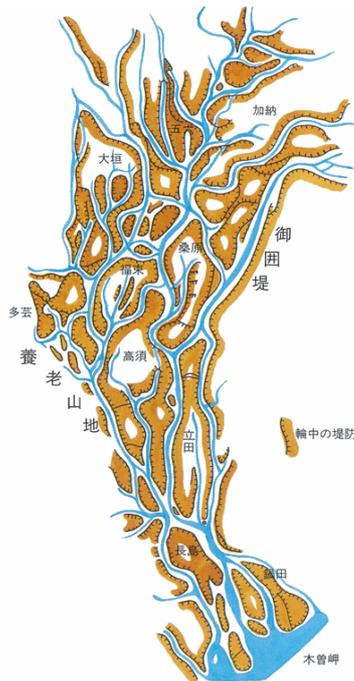
2.1.1 Riverine floods

10 Riverine flooding occurs when the volume of water in a river exceeds local capacity. The scale, frequency, intensity and duration of floods generally depend on the hydro-meteorological events that drive these events and the hydrological characteristics of the catchment, and the capacity of the natural drainage facilities in each region. While normally the meteorological characteristics do not change substantially over time, watershed characteristics undergo a continuous change due to human activities and can therefore affect changes in flood magnitudes. Because of their past experience, local communities often adapt to the floods.

11 However, with the ground conditions such as soil, seasonal variations in vegetation, snow-cover depth and imperviousness of the ground changing due to change in land use in upstream area, it affects the runoff characteristics. The magnitude of floods can be altered if changes are made in a river basin. Harvesting timber or changing land use from farmland to urban area can cause the runoff to increase and cause an increase in the magnitude of flooding. On the contrary, constructing flood-control dams can reduce the magnitude of floods in downstream by storing storm runoff in upper stream. Community in downstream area may not have enough data and information to understand and adapt to these changes. These changes can be identified only by long-ranged and basin-wide monitoring. The climate change also alters the run-off characteristics due to changes in meteorological elements that in turn impact the characteristics of riverine floods. The communities on Kiso-river basin in Japan have formulated their community-based dikes, called “Wa-ju” before major projects on river channel and dams. The traditional lifestyle in the region is accustomed to frequent floods (Figure 1) [2].



“Wa-ju” dikes before Meiji-era (1867)



Uplifted housing within “Wa-ju”



Figure 1. “Wa-ju” dikes and traditional life style

2.1.2 Flash floods, Mud flows and land slides

12 A flash flood is a rapid and extreme flow of high water into a normally dry area, or a rapid water level rise in a stream or creek above a predetermined flood level, beginning within six hours of the causative event [3]. However, the actual time threshold may vary. Sediment disasters, such as mud flows and landslides, often associated with such flash floods are defined as the phenomena that cause damage through a large-scale movement of soil and rock [4]. They are caused by combination of natural (topography, geology, vegetation, rainfall, earthquake, volcanic activity) and man-made (groundwater depletion, deforestation) factors. They result from relatively short, intense rainfall or failure of man-made structures, etc., and are particularly common in mountainous areas and desert regions. They present potential threat in any area where the terrain is steep, surface runoff rates are high, streams flow in narrow canyons and severe thunderstorms prevail. The only way to prepare for them is to be aware of the weather events that initiate them and pay attention when there is exceptionally heavy rainfall warning [5]. Community activities can be seen mostly at early warning collaborated with weather forecasts and people’s capacity building. The flood contest for school at the Klodzko County in Poland is one of the examples of educating children, and also adults through children [6]. Similar to flash floods, education and training by local community along with warning and evacuation system play a crucial role for mudflows and land slides [4].

2.1.3 Coastal floods

13 Inundation of land areas adjacent to ocean, caused by sea waters over and above normal tidal action causes coastal flooding. High tides and storm surges caused by tropical depressions and cyclones can cause coastal floods. While coastline configurations, offshore water depth and estuary shape can influence the intensity of coastal floods, coastlines themselves can change through coastal erosion. Tsunamis, mainly triggered by earthquakes in sea, sometimes can also cause coastal floods. Their magnitude depends on the size of depressions, cyclones or earthquakes. The effect of geography, unpredictable motions of coastal floods may cause serious damage to communities due to flooding beyond the community experience. The climate change, with the projected increase in the sea-level,



also impacts on the characteristics of coastal floods. There is an example of community activities beyond generations like a tradition [7].

2.1.4 Urban floods

14 Urban floods cause inundation of streets, basements, ground level floors of buildings etc. in urban areas. Most of them are originated from riverine floods, flash floods and coastal floods, but a number of them are combined with the inadequate capacity of the drainage system and this is more general within the urban area. When the drainage system is overwhelmed or cannot drain effectively into an outfall because of high river levels, the excess runoff flows along roads and urban areas. In addition, the conventional drainage systems have applied a combined sewer system, where rainfall drains into sewers carrying foul water and both are transferred to sewage treatment facilities. The capacity of such drainage systems depends on those of treatment facilities, mostly not enough for even relatively small rainfalls. Drainage overflow can be a major source of pollution, so there are also high probabilities to show sanitary or water quality problems. Change in land use may cause less filtration and increase in urban floods. The population settlement in a risked area also increases the frequency of floods. Such settlement always happens when cities' urban development master plans lack restrictions regarding the settlement of areas at risk of flooding or low-income population invades floodplain [8]. Because of variety of social groups and frequent change in inhabitants, the difficulty in organizing community participation for urban floods needs to be addressed.

2.2 SOCIAL AND ECONOMIC FACTORS AFFECTING COMMUNITY PARTICIPATION

15 Social and economic factors have influenced a society's characteristics in their willingness to participate in various activities in terms of their differences according to their constituents and the background around communities. Poor understanding for these factors may adversely affect the strategy adopted for organizing community participation and its sustainability. The fabric of the community, such as poverty, livelihood profile, cultural beliefs, status of weaker social groups, and rights of minority and ethnic groups, define their vulnerability to floods [9]. The framework for understanding community's state of development and the context in which floods could impact includes the basic five elements [10];

- Social structure (ethnic, class, religion and language, majority and minority),
- Cultural arrangements (family and cultural structure, hierarchy, common behaviour),
- Economic well-being (livelihood sources, labour, seasonality livelihood),
- Spatial characteristics (housing location, public service facilities, agricultural land), and
- Vulnerable households and groups (category and its location, cultural positions).

16 Vulnerability of a community can be characterized by; physical vulnerability of people and infrastructure; unfavourable organizational and economic conditions, and attitudes and motivations of the people. The community with higher development generally responds more effectively to the floods, as their relationship with provincial and federal government in flood preparation and response works like a partnership founded on historical background [11]. However, the same study shows that social capital can be a double-edged sword in cases of disaster management because it can effectively mobilise people through pre-existing associations to assist one another on one hand while it can also block or delay urgent decisions because of greater conflicts resulting from a flatter social structure on the other hand.

17 The disparity in wealth, gender, ages or culture/ethnic has harmful effects on success of community activities. It is not mere coincident that successful outcomes of community activities can be seen in equal society. Ethnic homogeneity, poverty (economic homogeneity), and gender are here described as social and economic factors in context of organizing community activities. Community strength based on resources and processes within a community maintain and enhance both individual



and collective wellbeing in ways consistent with the principles of equity, comprehensiveness, participation, self-reliance and social responsibility [12].

2.2.1 Ethnic homogeneity

18 There is a distinct relationship between ethnic homogeneity and social capital, mainly in trust and participation. Ethnically diverse localities are poor in networks and low in participation [13][14][15]. Individuals living in more racially fragmented areas participate less. One is the dynamics of ethnic construct of the community, especially with respect to immigrants to the community and the consequent necessity for paying attention for all the ethnical constituents of community.

2.2.2 Poverty

19 Like ethnicity, there is fairly strong evidence, both at national level and local level, that rates of civic participation are higher in societies with higher and similar income groups [13][14][15]. People living in more unequal communities are less likely to join groups. It appears that the economic homogeneity of a community conducts development of trust and participation, and makes organizing community activities easier. This means that addressing vulnerability and poverty reduction as part of flood management strategy is necessary for success of community activities for flood management. It is well known that traditionally the poorer sections of society are obliged to occupy flood prone lands. For instance, the most vulnerable were those living and farming on hillsides and near riverbanks [16]. This also means that organizing community participation requires twinning with the objectives of poverty reduction.

2.2.3 Gender

20 The gender disparity in decision-making power within homes harms the participation of women, thereby losing women's potential both in human resource and knowledge. Women organizations involved in community networking can be of great help in emergency response to crises. They mostly carry the stories of the neighbourhood or family about safety and self-protection by word of mouth. Voluntary work involving women behind the scenes helps organize people for social change in many communities [17].

2.3 ROLE OF COMMUNITY PARTICIPATION IN FLOOD MANAGEMENT

21 What kind of activities community can undertake in flood management? Community participation in flood management contributes through [10]:

- coordinating and facilitating individual efforts;
- building synergy effects and reducing costs;
- strengthening solidarity and enhancing effectiveness of cooperation within communities;
- providing platform for consensus building and conflict avoidance;
- supplementing national and local government efforts; and
- harmonizing flood management efforts with other development activities.

22 Experience from flood prone regions in South Asia indicates that the establishment of Community Flood Management Committees (CFMCs) with clearly defined institutional structures, roles and responsibilities before, during and after a flood, can be an effective platform for the participation of those most affected [18]. Even though this experience shows community participation mostly in rural area, the model with certain variations can apply also in urban area. These committees perform various functions such as:

- (1) assessing the needs and capability of the community,

- (2) making provisions for emergency situations,
- (3) raising awareness,
- (4) managing information for future references,
- (5) training and capacity-building,
- (6) networking, monitoring and reporting,
- (7) planning and interface with government institutions, and
- (8) resource mobilization

23 Community participation plays an essential role in every step in flood risk management, that is, preparedness for, response to and recovery from flood disasters (Figure 2). It should be noted here that community participation in flood risk assessment as well as in planning and implementation of risk management measures is a key to success of flood risk management plans.

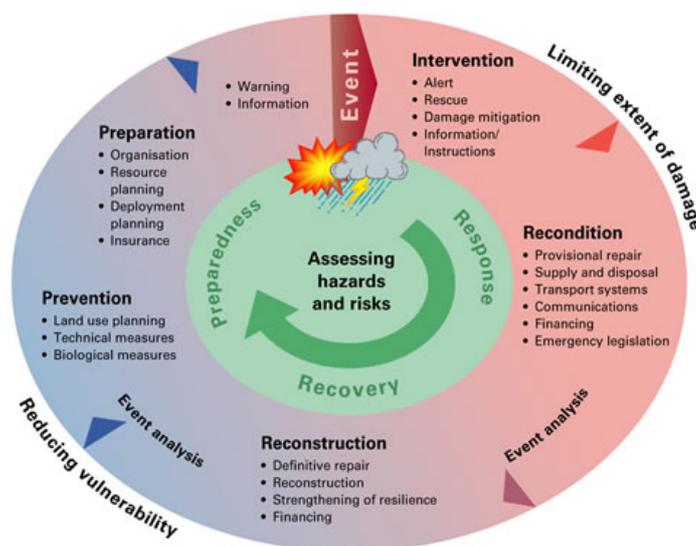


Figure 2. Risk Management Stages [19]

2.3.1 Preparedness

24 Planning for basin flood management for mitigation, land use planning and flood emergency planning are core activities at preparedness stage. At this stage, community participation in flood management contributes to building consensus among stakeholders and creating linkage with other activities.

25 It is important to draft a shared vision reflecting relevant stakeholders' needs, aspirations and concerns right at the beginning. The basin flood management plan requires participation of all stakeholders from agriculture, fishery, forest management, industry, urban development, environmental management, and local inhabitants themselves. The flood emergency plan requires the disaster management institutions to actively participate in the process. Each stakeholder has different perceptions of risk, and various community members and groups have different vulnerabilities and capacities, which are determined by age, gender, class, source of livelihoods, ethnicity, language, religion and physical location. Community participation can provide common field to overcome such a difference by focusing reducing loss and maximizing benefits from floods. Such an interest-based problem solving can create new options, and may avoid conflicts because each considers the need of others to maximize community's interest by reducing flood risks [20].

26 Under the IFM concept, flood management have linkage with other development processes, which aims at general improvement in people's quality of life and the natural environment, assuming



that addressing the root causes of floods, e.g. poverty, discrimination and marginalization, would contribute towards the overall improvement in the quality of life and environment. The coordination among other activities, such as land use planning, building codes, education, and water use management, can be managed through the community.

Flood risk assessment

27 While it is noted that the community activities do not exclude the need for experts' knowledge of hazard, it is important to let the community people come up with a collective understanding on their own vulnerability and capacity assessment. Flood hazard mapping is one of the effective activities to accumulate and share information for preparedness and awareness rising. Based on the probable flood or historical flood data by experts, community can identify effective evacuation routes and necessary actions to prepare for floods by themselves with the help of such maps. The field survey through this mapping also works well. Following six categories depending on the necessity may be recognised [21].

- (1) mapping risks and resources to identify hazards and vulnerability locations
- (2) discussing and brain-storming in groups to learn and foster ownership of community
- (3) identifying poorest and most vulnerable people
- (4) identifying all stakeholders for planning coordination and sharing responsibilities
- (5) preparing seasonal calendar for likely natural disasters, their frequency of occurrences
- (6) testing validity of plan and readiness of people to perform their responsibilities

28 There are strong correlations between marginalization of several populations and exposure to risks. In Bangladesh, vulnerability for disasters is perceived to be a complex interaction among unsafe conditions, poverty, lack of access to resources, landlessness, societal pressures, inequity, lack of education and other "under-development causes." All these need to be comprehensively factored in the design of community based management programme [21]. It is critical how the groups at risk including women, elderly, children and ethnic minorities are involved in community activities. Good governance in community activities facilitates networking and coordination of broad stakeholders' participation.

2.3.2 Response

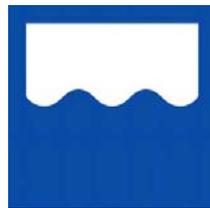
29 On one hand, various activities, such as training, drilling, and discussion related to flood management facilitates individual efforts and develops individual capacity to respond floods. The accumulation of individual activities expects synergy effects on group advantages. The sharing of experiences, methodologies and tools continues to enrich practice. On the other hand, traditional activities or pre-existing resources can enhance community activities through providing opportunity in regular basis. Regular reminders through participating community activities make it clear that responsibility for change rests with those living in the local community to ensure sustainability.

Awareness building

30 Sustaining people's awareness for floods is a critical point for organizing community activities. However, it is not easy because the awareness diminishes as time passes even though people are aware of flood risks just after major floods. Sustainability of community participation largely depends on awareness of community members. The "Ubiquitous Flood Sign" in downtowns for the purpose of people's awareness about floods, such as traces of flooding, the evacuation routes and destination camps started in Japan (Figure 3) [22]. The "Flooding" sign can shows traces of either historical flooding or projected flooding like 100-year flood. These marks were registered in Japan Industrial Standards (JIS) and seek possibility to apply them in global scale. The signs include standardized marks so that travellers or foreigners can also understand easily. This standardizing effort itself is challenging but can contribute to enhancing community participation. The broader the signs acknowledged, the more motivated community activities become. Most people do not always have so



much incentive to participate community activities, but watching and identifying flood risks in daily lives can facilitate them to participate.



Flooding Sign



Evacuation Sign



Figure 3. Standardized marks for flooding and examples in Japan

2.3.3 Recovery

31 Community participation can represent and bridge cooperation between those by individuals and by external agencies for flood management especially at recovery stage. Nobody can understand the local situation and needs better than the local communities themselves. Such needs should be supplemented by developing linkages among communities, government, national disaster management agencies and donors focusing on recovery from floods.



3. ORGANIZING COMMUNITY PARTICIPATION

32 Communities are at the frontline of disasters. Over the last two decades it has become apparent that top-down approaches to disaster risk management, ignoring the local capacities and resources, fail to address the specific local needs of vulnerable communities. In response to the limitations of this top-down methodology, the community-based disaster management emerged as an alternative approach, during the decades of 1980s and 1990s [23].

3.1 GENERAL PRINCIPLES

33 Community participation in various activities for flood management can be organized effectively keeping through three principles, that is, community's needs, effectiveness and efficiency, and practicable implementation.

- Community participation has to match community's needs for
 - vulnerability reduction
 - sustainability in activities for infrequent events
 - establishing public-private partnerships, NGOs
- Community participation keeps their effectiveness and efficiency by
 - synergy effects for limited financial and human resources
 - best-mixed methods with community experience and technological knowledge
 - connection between individual requirements and government preparedness
- Community participation seeks practicability for implementation
 - flood management in each stages (preparedness, response, recovery)
 - capacity-building and coordination through dialogue and participation
 - opportunities for 'real' activities, trainings and drills

3.2 STRATEGY FOR EFFECTIVE PARTICIPATION

34 Strategic approach in organizing community participation in flood management activities needs to address three perspectives; participatory process, resources maximization, and motivation.

3.2.1 Participatory process

35 Participatory process has been recognized as an essential element of community-based risk management that builds a culture of safety and ensures sustainable development. It addresses specific local needs of vulnerable communities to realize the full potential of local resources and capacities and actively engages them in flood risk management. Community based activities for flood management should be organized strategically based on necessary actions for each target group, that is, policymakers, disaster managers, trainers and community workers.

36 No matter how well sophisticated assessment has been done by experts only, it does not work without actions by local people. Community members are involved in the decision-making and implementation of risk management activities. There are smaller casualties in local community where community activities are indigenous and active than in urban area where community becomes weak and inactive during a flood [24]. It can not be ignored that people have survived disasters and crises through their own efforts. Different communities have their own perceptions regarding vulnerability and capacity depending on the condition of their locality and experiences acquired through past floods, so there are factors that could not measured and determined due to variable characteristics and conditions of the community. In this sense, community people's participation is indispensable in each step of activities toward floods; identification, analysis, preparation, response, monitoring and evaluation.

37 It is important to clarify as to what role is expected of each stakeholder and what degree of involvement is expected from each stakeholder. Specific roles and responsibilities of a particular stakeholder must be identified based on their understanding and abilities.

Orbits of stakeholder influence

38 The level of involvement of each stakeholder differs. Different levels would require the involvement of different stakeholders. Each stakeholder categorized decision-maker (DM), creators, advisers, reviewers, observers, and unsurprised apathetic, has a specific role to play and can be said to have an orbit of influence with respect to a particular activity (Figure 4)

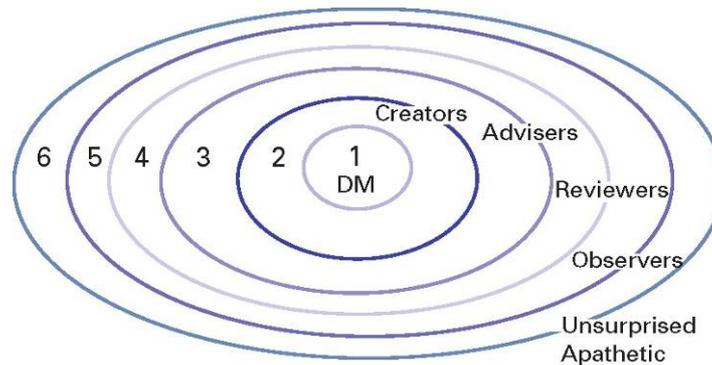


Figure 4. Orbits of stakeholder influence and community roles [9]

Levels of stakeholder participation

39 There are various participation methods with varying degrees of stakeholder involvement: provision of information, public hearings, consultations, collaboration in decision-making and delegation of responsibilities (Figure 5).

40 Table 1 shows a considered category at each community activity with context of expected roles in Figure 4 and levels of participation in Figure 5.

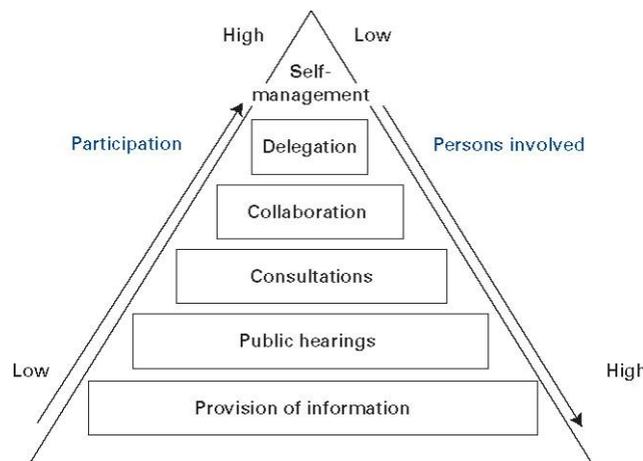


Figure 5. Levels of stakeholder participation [9]

**Table 1. Community activity and participation (example)**

Community activity - stakeholder	Stakeholder's role	Levels of participation
Prevention <i>Land use planning</i> - residents - community leader - water users - private sector	4 Reviewer 2 Creators 3 Advisers 4 Reviewer	Public hearings Delegation Collaboration Consultation
Preparedness <i>Emergency Preparedness</i> - residents - community leader - water users - voluntary organizations - private sector	4 Reviewer 2 Creators 3 Advisers 5 Observers 4 Reviewer	Public hearings Delegation Collaboration Consultation Consultation
Response - residents - community leader - water users - voluntary organizations - private sector	2 Creators 1 DM 3 Advisers 3 Advisers 3 Advisers	Collaboration Self-management Collaboration Collaboration Collaboration
Recovery - residents - community leader - water users - voluntary organizations - private sector	4 Reviewer 2 Creators 3 Advisers 3 Advisers 4 Reviewer	Public hearings Delegation Collaboration Collaboration Public hearings

3.2.2 Resources maximization

41 In most cases, local people have been aware of flood events and had their own way of coping with them, like a “culture of coping with and reducing floods”. Such knowledge inherent in the community area forms an important existing resource. The community based flood mitigation strategies should adopt, build upon and strengthen this local knowledge and promote its integrated use.

42 The Bicol region in the eastern part of the Philippines shows a culture of coping and preparedness developed because of their exposure to frequent, violent and devastating hazards natural to the area. The natives of the area are expecting and prepared to face five to six super typhoons in the last quarter of every year, along with the presence of an active volcano, Mt. Mayon. The local authorities in cooperation with communities have achieved a remarkable “zero casualty” rate under the three events of the volcanic eruption [21].

43 It should be noted, that in some communities, severe floods might be experienced with very long intervals between events. In such cases, the local coping mechanisms may lose its momentum. Investment in public awareness based on the scientific understanding of the phenomena, in such cases, is required. Since coping capacities by community may be overwhelmed in exceptional floods, external agencies should facilitate the application of the inherent coping system together with external support for resources and capacities, such as structural infrastructure and non-structural measures. External agencies involved should be aware of the local coping mechanism and provide the necessary support to enhance it. In addition, provision of complementary resources to deprived communities



has an important role in developing risk reduction culture because poorer communities with limited resources are forced to develop a coping culture rather than a risk-reduction culture. Table 2 provides a framework for assessing existing resources of the community.

Table 2. Check sheet for community practices [21]

Items to be checked	Rating of practices		
	Regularly	Seldom	Not practiced
Explanation of causes and effects of disasters; geographical, scientific and physical considerations.			
Explanations of environment and human interaction and its relationship to disasters; social, economic, cultural and political considerations.			
Discussion on sources and applications of disaster information. Particularly the elements of risk mapping and early warning system			
Exercises on disaster scenario-estimation of potential effects of disasters and what to do in relation to this scenario			
Discussion on lessons learned from previous disasters and what improvements may be necessary			

3.2.3 Motivation for initiating community participation

44 In many vulnerable communities, experience shows that flood issues are not always on high priority compared to daily survival issues such as livelihood, lack of water and sanitation facilities, law and order etc. This makes the community passive against flood risks as they are seen as remote occurrence. This makes the communities more vulnerable and sometimes more exposed to floods. To avoid such vulnerability, motivations for initiating community participation, such as socio-economic incentives and systematic training are indispensable. Better understanding begets higher aspirations among people, which is essential for motivation and sustainable ownership of the activities. Regular messages through telltales on important structures and locations, such as dykes and lifelines, make community aware of the risks and enhance their interest and motivation.

Shared vision for participation

45 It is important for every stakeholder and local people to share the same vision. This will lead to a sense of shared ownership and motivate community action. The case study in Bangladesh shows the community based activities connected with regional development as primary motivation²⁴. The raising of yards or homesteads through earth-fill not only safeguards them against flooding but also results in long-term livelihood benefits. Improvement of the economic status and accumulation of assets from activities for floods creates additional developmental opportunities for the community. This synergy effects show a good example of the integrated flood management (IFM), in which the objective is not only to reduce the losses from floods but also to maximize the efficient use of flood plains [25].

Motivation through economic incentives

46 One of the policy schemes motivating community based activities from economic incentives is flood insurance with community-based rating system [26]. In the US, the National Flood Insurance Program (NFIP), established in 1968 is a federal program enabling property owners in participating



communities to purchase insurance as protection against flood losses in exchange for State and community floodplain management regulations that reduce future flood damages. NFIP requires communities to maintain a minimum level of floodplain management for its residence to eligible to purchase flood insurance and established the Community Rating System (CRS) to encourage communities to exceed the minimum requirements. For CRS participating communities, flood insurance premium rates are discounted in increments of 5%; for example, a Class 1 community would receive a 45% premium discount, while a Class 9 community would receive a 5% discount (a Class 10 is not participating in the CRS and receives no discount). The CRS classes for local communities are based on 18 creditable activities, organized under four categories; public information, mapping and regulations, flood damage reduction, and flood preparedness. The participation to this program is voluntary, and only 20-30 % of those eligible participate in insurance programme [27]. However, economic incentives to enhance motivation could be worth considered.

Systematic training

47 Training enhances individuals or groups to develop their full potential and contribute to the success for a specific cause (flooding) [21]. The full potential here for flood management includes:

- 1) clear knowledge about the floods,
- 2) initiative to put the knowledge into practical actions,
- 3) enhanced capacity to respond flood, and
- 4) attitude to learn through trial and error for further improvement.

48 The six steps for training cycles are tailored to community activities (ANNEX I). Training is effective when the conceptual design, objectives, methodology and language are planned and adjusted in response to the demand and needs. In Indonesia, the training focused on both structural and non-structural mitigation. The training on non-structural mitigation involves Training for Trainers schemes with the school community. Based on the curriculum of the training, trainees could convey the necessary message to the school and children [21].

3.3 NECESSARY STEPS

49 The required and appropriate community participation varies and for the purpose of this tool, necessary steps quoted from some case studies are taken. Steps followed for the flood management/mitigation are patterned after the basic methodology in organizing for flood resilient community. Organizing community is just the first step towards effective participation in the activities. The goal of community participation is to transform vulnerable or at-risk communities to flood resilient communities. Based on the community contexts and organizational mandates, the process and requisites for organizing community participation are shown below referring six step of Integrate Flood Management basin planning [9].

1. Process design
 - identify the stakeholders related community activities
 - draft shared visions reflecting community's needs and concerns
 - launch a public awareness campaign to keep the community informed and ensure community participation in decision-making, implementation and review
 - identify information required and develop data collection methodology
2. Risk Assessment (to be presented in the form of maps, tables and graphs)
 - understand floods through historical records or hearing from people who experienced floods, as an existing local knowledge
 - create a database inventory determining:
 - current land-use practices
 - potential future land-use patterns
 - patterns of human settlement



- location of resources (natural and artificial)
 - map the natural courses of the river
 - undertake hazard assessment from a multi-hazard perspective
 - check to ensure that the risks identified are the same as those perceived by all stakeholders
 - facilitate the risk assessment at the community level
3. Problem analysis
- conduct vulnerability and capacity assessment to determine the community at risks
 - identify the human factors that contribute to flooding
 - identify the flood plain areas in terms of their risk level with respect to different magnitudes of floods
4. Setting goals
- determine objectives based on risk assessment results and vision
 - decide the scope of community activities. Goals are largely set by regional development objectives and driven by the need to reduce flood risks, secure livelihoods, sustain economic development and preserve environmental quality [28].
5. Draft an action plan
- evaluate various possible measures to address flood risks within the given scope such as land-use planning, building codes, zoning, conservation, drainage improvement, etc.
 - develop an action plan listing specific activities, roles and responsibilities of key stakeholders
 - set the timeline and the expected results
 - carry out economic analysis and financing arrangements
 - set monitoring, evaluation and review procedures
 - widely disseminate the draft plan, particularly to all those who are directly effected
6. Implementation [29]
- approval of the plan in the community
 - formation of community activities - The grassroots flood management/response organizations (community based organizations, groups or volunteers) are the key to mobilize the community at large.
 - Implementation of short-, medium-, and long-term community activities towards floods
 - monitoring and evaluation - continuous improvement of participation, documentation and dissemination of good practices for replication.



4 CONCLUSION AND RECOMMENDATION

50 The general objective of community participation is to save lives and damage to properties, by helping communities work to decrease their vulnerability and increase their capacity to reduce the impact of floods. Participation of community members and related stakeholders in flood management is essential in sustaining the flood risk reduction process for the community to meet intended aims and targets. Organizing community participation does not seek perfect implementation at the outset. It is expected that each community will gradually build up flood-resilient activities through continual efforts. To develop and establish general plans and measures, continual efforts are required such as in the business continuity [30]. A continual effort is a business management technique that is already incorporated in quality control, environmental management, and information security. Participatory planning for improvement and regular implementation for improvement should be noted for sustainable community base activities. Following issues need to be addressed while developing and implementing participatory community based activities.

- Community participation is fundamental and essential for each stage of the flood management, that is, preparedness for, response to and recovery from. They can seek to maximize the benefits through the related development activities within the river basin as a whole.
- Natural factors that affect the way community perceives and responds to flood risks can be described in terms of their magnitude (scale, duration, intensity) and frequency of the flood hazards.
- Socio-economic factors, in terms of poverty, livelihood profile, cultural beliefs, status of weaker social groups and rights of minority and ethnic groups, influence communities' willingness to participate.
- Community participation in flood risk assessment as well as in planning and implementation of risk management measures is a key to success of flood risk management plans.
- Community activities can be successfully used at every step in flood management;
 - o Preparedness: Community activities works for building consensus and collaborating with other development activities.
 - o Response: The accumulation of individual activities expects synergy effects on group advantages.
 - o Recovery: The cooperation among various stakeholders will be enhanced by participation of community.
- Community participation for flood management can be organized through community's needs, effectiveness and efficiency, and practicable implementation.
- Strategic approaches to organizing community participation comprise of three perspectives: resource maximization through integrated use of local knowledge, effective participatory process with clear understanding of each stakeholder's expected role and degree of involvement, and the motivation through socio-economic incentives.
- Organizing community participation can adapted from six step of Integrate Flood Management basin planning (process design, risk assessment, problem analysis, setting goals, draft an action plan, and implementation).
- Organizing community participation is gradually built to seek flood-resilient community through continual efforts. To develop and establish general plans and measures, continual and sustainable efforts are required.
- There is no single approach to organize community participation for flood management. Further continual accumulation of many cases can only facilitate them.

**ANNEX I STEPS FOR COMMUNITY TRAINING**

1. Know the situation	<ul style="list-style-type: none"> - hydrological and hydraulic condition - social background of the community - type of major floods the community faces and its frequency - extent damages due to the past floods - government and the other stakeholders' roles in early warning, pre-disaster preparedness and post-disaster emergency response - community's survival techniques and coping mechanisms - any kind of initiatives for flood mitigation
2. Identify the local resources	<ul style="list-style-type: none"> - practice of culture of coping with floods - structural and non-structural resources (dam, dike, warning system) - participation and support people in the community - experienced local people - support from the local government authorities - stakeholders who can be or are ready to involved - educational background (literacy etc.), training materials
3. Design the training course	<ul style="list-style-type: none"> - ensuring full and equal participation - a broader development effort for reducing causes of vulnerability - defining the roles and relationships of the identified stakeholders - putting importance to community assets development for socio-economic conditions of the community - set-ups for training, such as the number of participants, duration of training, available methods, contents with main points
4. Conduct the training	<ul style="list-style-type: none"> - significant role and responsibility on reduction of vulnerability - identifying potential stakeholders and encouraging the relationships with them - assessment of the benefits accumulation of tangible and intangible assets for reduction of vulnerabilities - encouraging activities integrated into regular development planning and budgeting - facilitating problem identification through participation - effective methodology like grouping exercise and role-playing
5. Assess the impact of the training	<ul style="list-style-type: none"> - attitude change in building up their capacity to take initiative at the community and reducing their dependence on external help - active involvement in decision-making and empowerment in access to potential resources according to requirement - formal institutional arrangements among stakeholders to improve accountability and transparency - motivation of initiating community activities on their own for flood preparedness and response
6. Learn the lesson	<ul style="list-style-type: none"> - behaviour changes to minimize their vulnerability to floods - methods and materials enough to motivate participants, user-friendly and accepted by participants - each stakeholder's degree of involvement and effective role in future activities - suggestions more effective towards a sustainable approach to cope with floods at the grass-root level - achievement in terms of continuing activities

Note) These steps are modified to community participation from tools for trainers [21].



ANNEX II FURTHER REFERENCE FOR ORGANIZING COMMUNITY PARTICIPATION FOR FLOODS

Note: non exclusive, alphabetical order

Country and region(s)	Brief description and reference information
Bangladesh - Melandaha Upazila - Nawabganj Upazila	The pilot project of “Community Approaches to Flood Management” as an introductory approach to Integrated Flood Management (IFM) as part of activity for Associated Programme on Flood Management (APFM) http://www.apfm.info/regional_projects/sastac.htm
Bangladesh	In addition to the improved Flood Forecasting and Warning System, more emphasis is now put on other non-structural means for flood mitigation, in particular by adopting a policy of involving communities in flood management. http://www.apfm.info/case_studies.htm
Bangladesh - Serajganj	Field testing the methodologies for Focal Group Discussion (FGD) in one of the flood vulnerable areas by Flood Proofing Project of CARE Bangladesh http://www.hyogo.uncrd.or.jp/publication/pdf/Guide/CBDMUsersGuide.pdf
Bangladesh - Tongi - Gaibandha	Bangladesh Urban Disaster Mitigation Program (BUDMP) to build on existing indigenous techniques, and use the collective social organization to develop a community-based flood mitigation strategy http://www.adpc.net/AUDMP/library/safer_cities/7.pdf http://www.adpc.net/AUDMP/library/safer_cities/8.pdf
Cambodia - Kampong Cham - Kandal - Prey Veng	Community-Based Flood Mitigation and Preparedness Project (CBFMP) to develop an organizational framework for flood vulnerability reduction by step-by-step process http://www.adpc.net/AUDMP/library/safer_cities/2.pdf http://www.adpc.net/AUDMP/library/safer_cities/3.pdf
Canada	After the recent flood in 1997, a comprehensive approach including the structural and non-structural methods should be considered more with participatory approaches. http://www.apfm.info/case_studies.htm
Central and Eastern Europe	The project aims in this phase at increasing community resilience to cope with the effects of flash floods especially under the circumstance where early warnings are not readily and timely available. http://www.apfm.info/regional_projects/ceetac.htm
Ethiopia	The national Water Sector Development Program (WSDP) based on the principles of the Water Resources Management Policy, was prepared with input from regional representatives. During detailed planning and implementation communities will have decisive roles especially in drinking water supply. Particularly in the Awash Valley, where the population is mostly pastoralists, and where the controlling of floods to avoid flooding of the grazing areas is not appreciated. http://www.apfm.info/case_studies.htm
Fiji	The National Disaster Management Act of 1998 gives authority and provides institutional arrangement for all actions related to disaster management and related activities, and defines the functions and duties of government and relevant agencies. Community co-operation and participation is recognized for the success of flood mitigation programmes. http://www.apfm.info/case_studies.htm
India - Assam	The pilot project of “Community Approaches to Flood Management” as an introductory approach to Integrated Flood Management (IFM) as part of



Country and region(s)	Brief description and reference information
<ul style="list-style-type: none"> - Bihar - West Bengal 	activity for Associated Programme on Flood Management (APFM) http://www.apfm.info/regional_projects/sastac.htm
Italy <ul style="list-style-type: none"> - Piemonte region 	Local communities were strongly involved in flood mitigation in three different activities: (i) the design of the emergency plan at local scale; (ii) the elaboration of such plans, and (iii) involvement in local groups of civil protection volunteers in emergency actions during critical events as defined in the emergency plans. http://www.apfm.info/case_studies.htm
Japan	After the Tokai heavy rain in 2000, adoption of comprehensive flood control measures formulated and implemented in consultation with communities. http://www.apfm.info/case_studies.htm
Kenya	The National Flood Management Strategy For Flood Management For Lake Victoria Basin, Kenya (The Strategy), which has been developed by Kenyan Experts in close collaboration with WMO and APFM, was developed as one of the pilot projects under the programme, including community activities. http://www.apfm.info/regional_projects/africa.htm
Mali <ul style="list-style-type: none"> - Niger River Inland Delta 	In 2002 as part of the Water Code, the problems related to flood management are considered and the responsibilities defined of the government and of decentralized units such as communes, district councils and regional councils. The on-going process of decentralization with the creation of communes will modify some of the responsibilities related to water resources management, which needs to be reflected in the laws and regulations. http://www.apfm.info/case_studies.htm
Mauritania <ul style="list-style-type: none"> - the lower delta of the Senegal River 	The management plan for the Diawling National Park, located in the lower delta of the Senegal River was synthesized with participatory manner, and showed involving local communities in the management of a protected wetland is feasible and beneficial and the ecosystem approach. http://www.apfm.info/case_studies.htm
Nepal <ul style="list-style-type: none"> - Saptari District - Rautahat District 	The pilot project of “Community Approaches to Flood Management” as an introductory approach to Integrated Flood Management (IFM) as part of activity for Associated Programme on Flood Management (APFM) http://www.apfm.info/regional_projects/sastac.htm
Pakistan	The applicability of an IFM approach both at the national as well as local was shown and the concept of community activities in all aspects of flood control is also clearly spelt out in The Third National Flood Protection Plan (1998-2012). http://www.apfm.info/case_studies.htm
Philippines <ul style="list-style-type: none"> - Pinagbayanan - Calauag in Quezon province - Catalina. - Minalin - Pampanga - Obando Bulacan 	Research and field testing for the tools and guidelines in sustaining the Community Basend Disaster Management (CBDM) including participatory rural appraisal (PRA) or participatory learning and action (PLA) http://www.hyogo.uncrd.or.jp/publication/pdf/Guide/CBDMUsersGuide.pdf



Country and region(s)	Brief description and reference information
Turkey - Northwestern Black Sea region	Local communities are needed to involve in effective solutions based on land-use control, zoning, building ordinance, modifications in building codes, flood information programs with major restructuring of legal systems and institutions. http://www.apfm.info/case_studies.htm
United Kingdom - Parrett River Basin	Wide range of stakeholders participated in decision-making in the Parrette Catchment Project following a severe summer flood in 1997 and a 1999/2000 winter flood. http://www.apfm.info/case_studies.htm
USA	Comprehensive historical review of flood management in Mississippi river and review of 30 years of the National Flood Insurance Programme includes participating communities to regulate land use in the flood plain. http://www.apfm.info/case_studies.htm
Viet Nam	Field testing for Community Based Disaster Management (CBDM) guidelines and tools implemented by United Nations Centre for Regional Development (UNCRD) with the Canadian Centre for International Studies and Cooperation (CECI) which has vast experience in managing projects on CBDM, Adaptation to Climate Change, Emergency response http://www.hyogo.uncrd.or.jp/publication/pdf/Guide/CBDMUsersGuide.pdf
Zambia	The Integrated Flood Management Strategy for the Kafue basin could be used as a model for developing a Flood Management Strategy for the whole of Zambia. http://www.apfm.info/regional_projects/africa.htm
Zimbabwe - Zambezi basin	The involvement of a broad spectrum of the population in management of floods, with particular emphasis on management at local level, has recently made the management of floods a lot easier than the traditional centralized approach. http://www.apfm.info/case_studies.htm
Africa, Asia, Latin America, Small Island	Case studies for Community Risk Assessment (CRA) placing communities in the lead role for the assessment, active planning, implementation and evaluation of activities aimed at reducing the community's risk to disaster In the website of Provention Consortium hosted by the International Federation of Red Cross and Red Crescent Societies. Africa (Madagascar, Sierra Leone, South Africa, Zambia, Zimbabwe, East Africa, Ghana, Mozambique, Rwanda) Asia (Bangladesh, Cambodia, India, Lao PDR, Pakistan, Philippines, Sri Lanka, Turkey) Latin America (Belize, El Salvador, Guatemala, Peru, Venezuela, Belize, Bolivia, Columbia, Costa Rica, Dominican Republic, Honduras, Panama) Small Island (Cuba, Jamaica, Solomon Islands, Vanuatu) http://www.proventionconsortium.org/
South America (Brazil/Uruguay)	The activities including an evaluation of the possible approaches to flood management duly assessed both structural as well as non-structural measures with active involvement of community. http://www.apfm.info/regional_projects/samtac.htm



REFERENCES

- [1] APFM (2004), *Synthesis of Manuals on Community Flood Management in Bangladesh, India, and Nepal*, http://www.apfm.info/regional_projects/sastac.htm (21 February 2008)
- [2] Kisogawa-Joryu River Work Office, MLIT, Japan <http://www.cbr.mlit.go.jp/kisojyo/child/index.html> (Japanese) (4 December 2007)
- [3] National Weather Service, USA, <http://www.weather.gov/glossary/> (13 February 2008)
- [4] Ministry of Land, Infrastructure and Transport (MLIT) and International Development Institute (2004), "Development of Warning and Evacuation System against Sediment Disasters in Developing Countries", *Guidelines for Construction Technology Transfer*, March 2004
- [5] News. Answers Corporation (2006) "flash flood." *Answers.com*. <http://www.answers.com/topic/flash-flood> (11 February 2008)
- [6] Institute of Meteorology, Poland, <http://www.powodz.info/> (13 February 2008)
- [7] Asian Disaster Reduction Center (2005), *Inamura no Hi* (Tsunami Awareness), <http://web.adrc.or.jp/publications/inamura/top.html> (13 February 2008)
- [8] Carlos E.M. Tucci (2006), *Urban Flood Management*, Cap-Net and APFM
- [9] APFM (2006), *Social Aspects and Stakeholder Involvement in Integrated Flood Management*, Flood Management Policy Series <http://www.apfm.info/publications.htm> (19 February 2008)
- [10] Imelda Abarquez and Zubair Murshed (2004), *Community-based Disaster Risk Management Field Practitioners' Handbook*, Asian Disaster Preparedness Center (ADPC) <http://www.adpc.net/pdr-sea/publications.htm> (14 February 2008)
- [11] Buckland, J., and M. Rahman (1999). "Community-based disaster management during the 1997 Red River flood in Canada", *Disasters* 23, 2: 174-191.
- [12] Alan Black and Philip Hughes (2001), The identification and analysis of indicators of community strength and outcomes, *Australian Government, Department of Families, Housing, Community Services and Indigenous Affairs, Occasional Paper Series No. 3, June 2001*, <http://www.facs.gov.au/internet/facsinternet.nsf/research/ops-ops3> (15 February 2008)
- [13] D. Johnson, B. Headey and B. Jensen (2003), "Communities, social capital and public policy: literature review, Melbourne Institute of Applied Economic and Social Research", Parkville Victoria, *Melbourne institute working paper*, n° 26/03, November, 84 p., <http://www.melbourneinstitute.com/wp/wp2003n26.pdf> (26 February 2008)
- [14] Knack, S. and P Keefer (1997) "Does Social Capital Have an Economic Payoff: A Cross Country Investigation", *The Quarterly Journal of Economics* 1251-1285.
- [15] Alesina, A and La Ferrara, E (2000) "Participation in Heterogeneous Communities", *The Quarterly Journal of Economics*, August, 847-904.
- [16] IUCN (2003), *Livelihoods and climate change : combining disaster risk reduction, natural resource management and climate change adaptation in a new approach to the reduction of vulnerability and poverty*, IUCN ; International Institute for Sustainable Development ; Stockholm Environment Institute ; Swiss Development Cooperation ; Intercooperation ; Task Force on Climate Change, Vulnerable Communities and Adaptation - Winnipeg, MB : IISD, 2003. <http://www.iucn.org/dbtw-wpd/exec/dbtwpub.dtl> (19 February 2008)
- [17] Elaine Enarson et al. (2003) *Working with women at risk: practical guidelines for assessing local disaster risk*, International Hurricane Center, Florida International University, <http://www.ihrc.fiu.edu/lssr/workingwithwomen.pdf> (22 February 2008)
- [18] Prasad, K. (2005), *Community Approaches to Flood Management in India*, APFM, http://www.apfm.info/pdf/pilot_projects/manual_india.pdf. (14 February 2008)
- [19] Swiss Confederation, The Cycle of integrated risk management, <http://www.planat.ch/index.php?userhash=47851918&l=e&navID=5> (29 February 2008)
- [20] Dunning, M.C. (1998). Collaborative Problem Solving for Installation Planning and Decision Making, *Public Involvement and Dispute Resolution*, vol.2, IWR Report 98-R-5, Alexandria, V.A., pp135-140
- [21] United Nations Centre for Regional Development (UNCRD) (2004), *Sustainable Community Based Disaster Management (CBDM) Practices in Asia, A User's Guide*,



- <http://www.hyogo.uncrd.or.jp/publication/pdf/Guide/CBDMUsersGuide.pdf> (14 December 2007)
- [22] Ministry of Land, Infrastructure and Transport, Japan (2006), *Marugoto-Machigoto Hazard map no suishin* (Enhancing hazard map ubiquitous in downtown) (Japanese) http://www.mlit.go.jp/kisha/kisha06/05/050703_.html (5 October 2007)
- [23] ADPC, *Based Disaster Risk Management*, <http://www.adpc.net/v2007/Programs/CBDRM/Default.asp> (4 December 2007)
- [24] Gen Tanahashi (2005), “Niigata’s Disaster Information at the flood of 13 July, 2004” (Japanese) <http://www.mlit.go.jp/chosahokoku/h17giken/program/kadai/pdf/ippan/bos1-04.pdf> (8 January 2008) pp.13-16
- [25] APFM (2004). *Integrated Flood Management – Concept Paper*. http://www.apfm.info/pdf/concept_paper_e.pdf (5 October 2007)
- [26] FEMA, *National Flood Insurance Program (NFIP)*, Floodsmart.gov, <http://www.floodsmart.gov/floodsmart/pages/aboutnfip.jsp> (19 February 2008)
- [27] Gerry Galloway (2004), *IFM Case Study: USA: Flood Management – Mississippi River*, http://www.apfm.info/pdf/case_studies/cs_usa_mississippi.pdf (28 February 2008)
- [28] ADPC (2002), *Safer Cities 2*, http://www.adpc.net/AUDMP/library/safer_cities/2.pdf (5 December 2007)
- [29] ADPC (2004), Proceedings for Regional Workshop on Best Practices in Disaster Mitigation: Lessons Learned from the Asian Urban Disaster Mitigation Program and other initiatives 24 – 26 September 2002, Bali, Indonesia, <http://www.adpc.net/audmp/rllw/table.html> (4 December 2007)
- [30] Cabinet Office, Government of Japan (2005) *Business Continuity Guidelines 1st ed. -Reducing the Impact of Disasters and Improving Responses to Disasters by Japanese Companies-*, Central Disaster Management Council Special Board of Inquiry on enhancing disaster management by utilizing the private sector and markets Corporate Evaluation/ Business Continuity Working Group, August 1, 2005